

Introduction

Although many decisions remain in the initial stages of the Future Combat Systems (FCS) development, one thing is certain: The FCS Mobile Gun System will require accurate, lethal, and responsive ammunition allowing line-of-sight (LOS) and beyond-line-of-sight (BLOS) target engagement. Consistent with concepts outlined in the lead system integrator block approach to FCS and the draft FCS Operational Requirements Document, the Mid-Range Munition (MRM) is the FCS Block I choice for lethality. MRM will add to the Army's combat capability by increasing standoff distance, reducing the logistics footprint, and decreasing the efficacy of enemy countermeasures.

Currently scheduled for a Technology Readiness Level (TRL) 6 guide-to-hit demonstration in September 2003, MRM provides both LOS and BLOS lethality for Block I FCS. It enables FCS to defeat advanced heavy armor threats and other targets to ranges 8 kilometers and beyond. Moreover, it supports FCS Block I objectives of expanding the battlespace and having a multimission direct-fire capability for the unit of action. It encompasses state-of-the-art seeker and lethal mechanism technologies, thus mitigating development risk for FCS Block II lethality, the Multi-Role Armament and Ammunition System. After a successful TRL 6 demonstration, a Milestone B decision advances the program into system development and demonstration (SDD) in time for FCS first unit equipped in FY08.

Current plans call for one of two competing MRM concepts to be chosen for an anticipated 48-month SDD. The Alliant Techsystems concept comprises a millimeter wave seeker and a kinetic energy projectile—essentially a long rod penetrator boosted into the target. The Raytheon concept has an infrared seeker and a shaped-charge warhead. While seekers will be tested in the guide-to-hit demonstration in the autonomous mode, the addition of offset targeting capability and fire control integration is contemplated for SDD. Although each concept has differing technology and test methods, common success criteria have been developed at both the system and subsystem levels.

Guide-To-Hit Demonstration

The guide-to-hit demonstration, to be conducted at Yuma Proving Ground, AZ, is a system-level evaluation. It con-

THE MID-RANGE MUNITION BLOCK I FCS LETHALITY

LTC Dave Rice

sists of a minimum of one round fired at ambient temperature and normal gun velocity to a minimum target range of 5 kilometers. The target is a modern threat main battle tank within the expected sensor footprint. Each competing round will be expected to launch without damage to the cannon, demonstrate stable flight, activate its seeker, detect and track the target, maneuver to the target, and hit the target on the intended aim-point within the allocated circular error probable.

The first subsystem evaluation will be for lethality. This will evaluate performance at a range between 3 and 8 kilometers and will measure target perforation and hole size. Additional analysis will measure probability of kill given a hit.

The airframe subsystem will be tested across all temperatures. The intent of this evaluation is to measure strength of design and the airframe's ability to achieve maximum range at 18-degrees quadrant elevation. The airframe will be expected to achieve a range of 8 kilometers at ambient temperature, have no structural failures, fully deploy its fins, and achieve the proper spin rate.

The MRM seeker/guidance and control subsystem will be tested both in a gun and in an operational environment exceeding 105 percent of maximum acceleration. In both cases, the intent is to measure the seeker's ability to respond to a series of maneuver commands. It is required to maneuver the projectile within pre-established predictions and maintain stable flight.

A minimum of three rounds fired across the temperature spectrum will test the propulsion subsystem. The rounds will be equivalent to tactical propellant performance, with a slug representing the appropriate mass and volume. The launch must not damage the gun and achieve ambient muzzle velocity.

Conclusion

The engineering groundwork ensuring a successful TRL 6 demonstration is firmly in place. Thus far, both contractors have successfully demonstrated air-frame structural integrity and gun propulsion elements. Moreover, the airframe has already verified maximum range. Captive flight tests are planned to demonstrate seeker performance against an array of stationary and moving targets. Upon completion of the demonstration, the baseline design will be established; subsystems will have been designed, built, and tested; and hardware- and software-in-the-loop environments will be established to facilitate advanced development.

Beginning SDD in FY04 synchronizes MRM with the FCS schedule. Further reducing risk in the SDD phase is a TRL 7 demonstration (an actual system in an operational environment), followed by an interim Milestone B review. Success in these two events clears the way for building production qualification test hardware, the initial operational test and evaluation and, ultimately, the Milestone C and low-rate production decisions.

The MRM is well on its way to a successful TRL 6 demonstration in September 2003, followed by entry into SDD. It leverages existing technologies and is already demonstrating success at the subsystem level. The analytical and engineering underpinnings are already in place to reduce risk and ensure that this effective force multiplier will be ready for Block I FCS lethality.

LTC DAVE RICE is the Product Manager for Large Caliber Ammunition, Program Executive Office, Ammunition, Picatinny Arsenal, NJ.

Supporting
The
Force